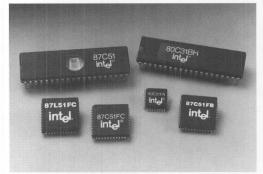
MCS[®] 51 Microcontroller Architecture

PRODUCT OVERVIEW



Intel's 8-bit MCS[®] 51 family of microcontrollers has become an industry standard for embedded control. The architecture is optimized for control-oriented applications. Intel offers a wide variety of 8-bit microcontrollers with various versions of on-board EPROM and ROM memory as well as CPU only. As a result, Intel gives you the ability to meet your specific application needs by offering EPROM, one-time programmable (OTP), ROMless and ROMbased microcontrollers. The HMOS 8051 family is often used for cost sensitive designs while the 80C51 family, which utilizes Intel's proven CHMOS technology provides lower power, higher integration and higher performance.

PACKAGING

- Packaging options include:
- Plastic Leaded Chip Carrier (PLCC)
- Plastic Dual In-Line (PDIP)
- Plastic Quad Flat Pack (PQFP)
- Windowed CERDIP

KEY FEATURES

- 8-bit CPU optimized for control applications
- Extensive Boolean processing (single bit) capabilities
- 64K Program Memory address space
- 64K Data Memory address space

NEW PRODUCTS

8XL51FA/FB/FC

The 8XL51FA/FB/FC is a 3V/3.3V version of the current 8XC51FA/FB/FC and will operate from 2.7V to 3.6V to the maximum frequency of 20 MHz for commercial temperature range and 16 MHz for express temperature range. It is functionally and performance compatible with the 5V 8XC51FA/FB/FC product line. The 3V/3.3V version offers the advantages of much lower power consumption, improved noise levels and enhanced protection features.

8XL52/L54/L58

The 8XL52/L54/L58 is the 3V/3.3V version of the current 8XC52/C54/C58 and will operate from 2.7V to 3.6V to the maximum frequency of 20 MHz for commercial temperature range and 16 MHz for express temperature range. It is functionally and performance compatible with the 5V 8XC52/C54/C58 product line. The 3V/3.3V version offers the advantages of much lower power consumption, improved noise levels and enhanced protection features.

87C51SL

The 87C51SL provides a single chip keyboard controller to the notebook PC application. Both 5V in PQFP package and 3.3V in SQFP package are available with a newly introduced OTP EPROM option. It is used in conjunction with the Intel486[™] SL-enhanced processor based design.

- On-chip Program Memory (Up to 32 Kbytes)
- On-chip Data RAM (Up to 256 bytes)
- Bidirectional and individually addressable I/O lines
- Full duplex UART

KEEPING YOU ONE DESIGN

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DEVELOPMENT SUPPORT TOOLS

Software Development

Complete sets of development utilities and C compilers are available through third party vendors**.

In-Circuit Emulation

Third party vendors** are supporting development tools for incircuit emulators.

Evaluation Boards

EV8XC51FX/GX Evaluation Boards are also available to assist with software development and debugging.

Programming Support

Third party programming support for Intel's EPROM and OTP microcontrollers is provided by third party vendors**.

Fuzzy Logic

Inform Software Corporation is supporting fuzzy logic software for MCS 51 microcontrollers. See the MCS 51 Microcontroller Development Tools line card for further information.

ApBUILDER Interactive Application

Programming Package

*Ap*BUILDER is a powerful new design tool for the embedded control application programmer. This product will speed up the learning curve and reduce total design time.

ApBUILDER software includes:

- On-line peripheral programming
- Hypertext reference documents
- Windows* screens for ease of use
- Assembly instruction syntax error
- On-line data sheets
- Available in Q2/94

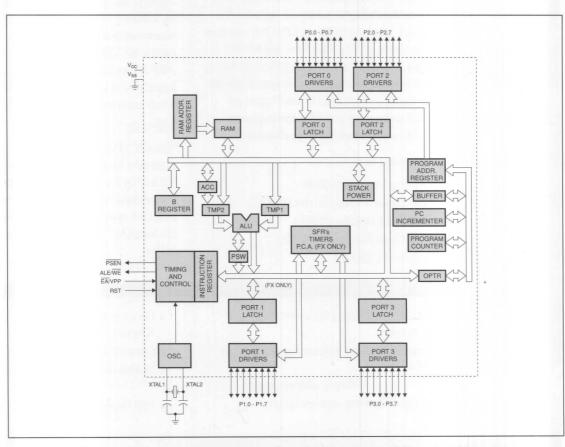
ACE51 Electronic Documentation/Configuration Utility ACE51 is a PC-based expert system that uses artificial intelligence to provide on-line documentation and assists in developing code for device peripherals. ACE51 software includes:

- Hypertext manual which provides highlighted links to related topics
- Design modules to assist in programming device peripherals
- Application modules which provide examples of customized code for specific functions.

Intel offers a wide variety of HMOS and CMOS 8-bit microcontrollers. In addition, Intel provides training, technical support, and a commitment to quality and service.

**Third Party Vendors

A comprehensive listing of third party vendors, their support tools and contact information is available in the MCS 51 Development Tools Line Card (literature order number: 272342) or through Intel's FaxBack* system by calling 1 (800) 628-2283 and requesting document #2622.



MCS° 51 Microcontroller Architecture Block Diagram

MCS[®] 51 Microcontroller Family Product Line

| RODUCT | ROM/EPROM FLASH | RAM | TIMER/ COUNTERS | I/O PINS | MAX SPEED (MHz) | PROCESS | PACKAGE | SECURITY | KEY FEATURES |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------|-------------|------------------------------------|---------|-----------------------|----------|-----------------------------------------|
| 051 PRODUCT L | INE | | | | | | | | |
| 3031AH | ROMLESS | 128 | 2 | 32 | 12 | HMOS | P, N, D | N/A | BOOLEAN PROCESSING |
| 051AH | 4K ROM | 128 | 2 | 32 | 12 | HMOS | P, N, D | Р | BOOLEAN PROCESSING |
| 751H | 4K EPROM | 128 | 2 | 32 | 12 | HMOS | D | L1 | ONE LEVEL MEMORY LOCK |
| 751BH | 4K EPROM | 128 | 2 | 32 | 12 | HMOS | P, N | L2 | TWO LEVEL MEMORY LOCK |
| 52 PRODUCT L | INE | | | | | | | | |
| 032AH | ROMLESS | 256 | 3 | 32 | 12 | HMOS | P. N. D | N/A | THREE TIMER COUNTERS |
| 052AH | 8K ROM | 256 | 3 | 32 | 12 | HMOS | P, N, D | NO | THREE TIMER COUNTERS |
| 752BH | 8K EPROM | 256 | 3 | 32 | 12 | HMOS | | | |
| NAME AND ADDRESS OF TAXABLE PARTY. | our burners and and an and the second surgers and the | 236 | | 32 | | HIVIO3 | P, N, D | L2 | TWO LEVEL MEMORY LOCK |
| C51 PRODUCT | LINE | | | | | | | | |
| 0C31BH | ROMLESS | 128 | 2 | 32 | 12, 16 | CHMOS | P, N, D, S | N/A | POWER SAVE MODES |
| 0C51BH | 4K ROM | 128 | 2 | 32 | 12, 16 | CHMOS | P, N, D, S | Р | POWER SAVE MODES |
| 7C51 | 4K EPROM | 128 | 2 | 32 | 12, 16, 20 | CHMOS | P, N, D, S | L3 | TWO LEVEL MEMORY LOCK |
| C52/C54/C58 P | RODUCT LINE | | | | | | | | |
| 0C32 | ROMLESS | 256 | 3 | 32 | 12, 16, 20, 24i | CHMOS | P, N, S | N/A | UP/DOWN TIMER/COUNTER |
| 0C52 | 8K ROM | 256 | 3 | 32 | 12, 16, 20, 24 | CHMOS | P, N, S | L1 | UP/DOWN TIMER/COUNTER |
| 7C52 | 8K EPROM | 256 | 3 | 32 | 12, 16, 20, 24 | CHMOS | P, N, D, S | L3 | UP/DOWN TIMER/COUNTER |
| 0C54 | 16K ROM | 256 | 3 | 32 | 12, 16, 20, 24 | CHMOS | P, N, D, S P, N, S | L3 L1 | UP/DOWN TIMER/COUNTER |
| 7C54 | 16K EPROM | 256 | 3 | 32 | 12, 16, 20, 24i 12, 16, 20, 24i | CHMOS | P, N, S P, N, D, S | L3 | UP/DOWN TIMER/COUNTER |
| 0C58 | 32K ROM | 256 | 3 | 32 | 12, 16, 20, 24 | CHMOS | P, N, D, S P, N, S | L3 L1 | UP/DOWN TIMER/COUNTER |
| 7C58 | 32K EPROM | 256 | 3 | 32 | 12, 16, 20, 24 | CHMOS | P, N, S P, N, D, S | L3 | UP/DOWN TIMER/COUNTER |
| And a state of the | THE REAL PROPERTY OF THE PROPERTY OF THE REAL PROPE | 200 | 3 | 32 | 12, 10, 20, 241 | CHIVIUS | F, N, D, S | L3 | |
| (L52/L54/L58 PF | A REAL PROPERTY AND A REAL | | | | | | | | |
| 0L52 | 8K ROM | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L1 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 7L52 | 8K OTP | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L3 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 0L54 | 16K ROM | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L1 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 7L54 | 16K OTP | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L3 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 0L58 | 32K ROM | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L1 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 7L58 | 32K OTP | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L3 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| (C51FA/FB/FC P | RODUCT LINE | | | | | | | | |
| 0C51FA | ROMLESS | 256 | 3 | 32 | 12, 16, 20, 24i | CHMOS | P. N. S | N/A | PROGRAMMABLE COUNTER ARRAY (PCA) |
| 3C51FA | 8K ROM | 256 | 3 | 32 | 12, 16, 20, 24 | CHMOS | P, N, S | L1 | |
| 7C51FA | 8K EPROM | 256 | 3 | 32 | | | | | PROGRAMMABLE COUNTER ARRAY (PCA) |
| 3C51FB | | 256 | 3 | | 12, 16, 20, 24i | CHMOS | P, N, D, S | L3 | PROGRAMMABLE COUNTER ARRAY (PCA) |
| | 16K ROM | | 3 | 32 | 12, 16, 20, 24i | CHMOS | P, N, S | L1 | PROGRAMMABLE COUNTER ARRAY (PCA) |
| 37C51FB | 16K EPROM | 256 | | 32 | 12, 16, 20, 24i | CHMOS | P, N, D, S | L3 | PROGRAMMABLE COUNTER ARRAY (PCA) |
| 33C51FC 37C51FC | 32K ROM 32K EPROM | 256 256 | 3 | 32 32 | 12, 16, 20, 24i | CHMOS | P, N, S | L1 | PROGRAMMABLE COUNTER ARRAY (PCA) |
| STATISTICS OF STREET, STRE | the second s | 256 | 3 | 32 | 12, 16, 20, 24i | CHMOS | P, N, D, S | L3 | PROGRAMMABLE COUNTER ARRAY (PCA) |
| (L51FA/FB/FC P | RODUCT LINE | | | | | | | | |
| 0L51FA | ROMLESS | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | N/A | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 3L51FA | 8K ROM | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L1 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 7L51FA | 8K OTP | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L3 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 3L51FB | 16K ROM | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L1 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 7L51FB | 16K OTP | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L3 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 3L51FC | 32K ROM | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L1 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| 7L51FC | 32K OTP | 256 | 3 | 32 | 12, 16, 20* | CHMOS | N, S | L3 | LOW VOLTAGE PART, 2.7V TO 3.6V |
| C51GB PRODU | the local distance of the local distance where the | | | | | | | | |
| A DESCRIPTION OF A DESC | and the second se | | | | | | | | |
| XC51GB | ROMLESS | 256 | 3 | 48 | 12, 16 | CHMOS | N1 | N/A | 8 CHANNEL 8-BIT A/D. 2 PCA, 6 I/O PORTS |
| 3C51GB | 8K ROM | 256 | 3 | 48 | 12, 16 | CHMOS | N1 | L1 | 8 CHANNEL 8-BIT A/D. 2 PCA, 6 I/O PORTS |
| 7C51GB | 8K EPROM | 256 | 3 | 48 | 12, 16 | CHMOS | N1 | L3 | 8 CHANNEL 8-BIT A/D. 2 PCA, 6 I/O PORTS |
| (C152 PRODUC | TLINE | | | | | | | | |
| 0C152JA | ROMLESS | 256 | 2 | 40 | 16.5 | CHMOS | P1, N1 | N/A | MULTI-PROTOCOL SERIAL COMMUNICATION |
| 0C152JB | ROMLESS | 256 | 2 | 56 | 16.5 | CHMOS | N1 | N/A | MULTI-PROTOCOL SERIAL COMMUNICATION |
| 3C152JA | 8K ROM | 256 | 2 | 40 | 16.5 | CHMOS | P1, N1 | NO | MULTI-PROTOCOL SERIAL COMMUNICATION |
| C51SL PRODU | IN COLUMN 2 IS NOT THE OWNER OF TAXABLE PARTY AND THE | | | | | | | | |
| COLONIAL CONTRACTOR | CONTRACTOR OF A DESCRIPTION OF A | 050 | | | | | | | |
| 0C51SL-AH | ROMLESS | 256 | 2 | 87 | 16 | CHMOS | KU | NO | CUSTOMIZABLE KEYBOARD CONTROL |
| 1C51SL-AH | 16K ROM 1 | 256 | 2 | 87 | 16 | CHMOS | KU | NO | CUSTOMIZABLE KEYBOARD CONTROL |
| 3C51SL-AH | 16K ROM 2 | 256 | 2 | 87 | 16 | CHMOS | KU | NO | CUSTOMIZABLE KEYBOARD CONTROL |
| 7C51SL-AH | 16K OTP | 256 | 2 | 87 | 16 | CHMOS | KU | NO | CUSTOMIZABLE KEYBOARD CONTROL |
| 005101 11 | DOLU SOO | 070 | | | | | | 1 | |
| OC51SL-AL | ROMLESS | 256 | 2 | 87 | 16 | CHMOS | SB | NO | LOW VOLTAGE VERSION, 3V TO 3.6V |
| B1C51SL-AL | 16K ROM 1 | 256 | 2 | 87 | 16 | CHMOS | SB | NO | LOW VOLTAGE VERSION, 3V TO 3.6V |
| 33C51SL-AL | 16K ROM 2 | 256 | 2 | 87 87 | 16 | CHMOS | SB | NO | LOW VOLTAGE VERSION, 3V TO 3.6V |
| 37C51SL-AL | 16K OTP | 256 | | | 16 | CHMOS | SB | NO | LOW VOLTAGE VERSION, 3V TO 3.6V |

PACKAGES: P = 40 PDIP, N = 44 PLCC, S = 44 QFP (QUAD FLAT PACK), KU = 100 QFP, D = 40 CERDIP, N1 = 68LD PLCC, P1 = 48LD PDIP, SB = 100 SQFP

SECURITY: P = PROTECTED, L1 = 1 LOCK BIT, L2 = 2 LOCK BITS, L3 = 3 LOCK BITS

SPEED: 24i = 24 MHz INTERNAL-ONLY OPERATION, 20* = 20 MHz AVAILABLE FOR COMMERCIAL TEMPERATURE RANGE ONLY.

ROM: ROM 1 = STANDARD ROM CODE, ROM 2 = CUSTOMIZABLE ROM CODE

NOTE: PROGRAMMABLE COUNTER ARRAY (PCA) ALLOWS CONFIGURATIONS OF PWM'S, COMPARE/CAPTURE MODULES, HIGH SPEED OUTPUTS, WATCH DOG TIMER

| Intel Reference Numbers | |
|----------------------------------------------|---------------------------------------------------------|
| FaxBACK System: | 1 (800) 628-2283 or (916) 356-3105 |
| Application Bulletin Board System: | (916) 356-3600 |
| Other Intel Support Intel Literature Center: | 1 (800) 548-4725 7 a.m. to 7 p.m. CST |
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UNITED STATES Intel Corporation 2200 Mission College Boulevard P.O. Box 58119 Santa Clara, CA 95052-8119

JAPAN Intel Japan, K.K. 5-6 Todokai, Tsukuba-shi Ibakari 300-26

FRANCE Intel Corporation S.A.R.L. 1, Rue Edison, BP 303 78054, Saint Quentinen-Yvelines Cedex

UNITED KINGDOM (U.K.) Ltd. Pipers Way Swindon SN3 1RJ

Intel Corporation Wiltshire, England

GERMANY Intel GmbH Dornacher Strasse 1 85622 Feldkirchen/Muenchen

HONG KONG Intel Semiconductor Ltd. 32/F Two Pacific Place 88 Queensway Central

CANADA Intel Semiconductor of Canada, Ltd. 190 Attwell Drive, Suite 500 Rexdale, Ontario M9W 6H8

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